Northern Rhodesia

Department of Agriculture

ANNUAL REPORT
for the Year
1951

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STAFF LIST AT 31st DECEMBER, 1951

Headquarters, Lusaka.

M. Halcrow, O.B.E., Deputy Director (Acting Director).
R. B. Reid, Agricultural Officer.
N. M. W. Irvin, Acting Office Superintendent.
H. de B. Barwis, Clerk (Accounts).
Miss G. M. N. Briggs, Stenographer.
Mrs. F. E. Gourdie, Clerk.

Research and Specialist Services.

C. G. Trapnell, O.B.E., Ecologist (Seconded E.A.A. and F.R.O.).
E. Pawson, Soil Chemist, Mount Makulu Research Station, Lusaka.
E. M. Clegg, Soil Scientist, Mount Makulu Research Station, Lusaka.
J. R. Duckworth, Agricultural Supervisor, Mount Makulu Research Station, Lusaka.
Mrs. M. Duckworth, Temporary Clerk, Mount Makulu Research Station, Lusaka.

Conservation Section.

J. N. Clothier, Chief Conservation Officer, Headquarters, Lusaka.
Mrs. R. O. M. Phillips, Temporary Clerk, Headquarters, Lusaka.
J. P. Hughes, Clerk (Accounts), Headquarters, Lusaka.
A. N. Beaumont, Conservation Officer, Lusaka.
J. T. Anderson, Conservation Superintendent, Lusaka.
T. Bell, Workshop Mechanic, Lusaka.
F. M. Duncan, Workshop Mechanic, Lusaka.
J. Martin, Workshop Mechanic, Lusaka.
J. MacDonald, Mechanical Supervisor, Lusaka.
J. Wells, Mechanical Supervisor, Lusaka.
P. E. Maitin, Conservation Officer, Broken Hill.
W. A. Davidson, Mechanical Supervisor, Broken Hill.
P. G. Jones, Agricultural Supervisor, Mazabuka.
D. F. Locke, Mechanical Supervisor, Mazabuka.
J. Mackenzie, Conservation Officer, Livingstone.

Tobacco Section.

J. C. Collins, Tobacco Adviser, Headquarters, Lusaka.
Miss M. E. Kirkwood, Clerk, Headquarters, Lusaka.
A. Carr, Assistant Tobacco Adviser, Fort Jameson.
W. J. D. Watson, Agricultural Supervisor, Choma Tobacco Experimental Station, Choma
T. Hodges, Agricultural Supervisor, Choma Tobacco Experimental Station, Choma.
F. J. Barrett, Agricultural Supervisor, Msekera.
W. A. Masters, Agricultural Supervisor, Msekera.

Barotse Province.

D. U. Peters, Agricultural Officer, Mongu.
T. J. Greatrex, Agricultural Supervisor, Mongu.

Western Province.

J. A. Allan, Agricultural Officer, Ndola.
Mrs. E. J. Wilson, Temporary Clerk, Ndola.
E. F. Dowdall, Agricultural Supervisor, Ndola.
A. T. Wilson, Agricultural Officer, Fort Rosebery.
G. W. E. Pickworth, Agricultural Supervisor, Kambowa.
J. M. Robertson, Agricultural Supervisor, Kawambwa.
P. P. Buchanan, Agricultural Supervisor, Kabompo.

Central Province.

B. C. Wills, Agricultural Officer, Broken Hill.
D. C. Thornton-Dibb, Agricultural Supervisor, Broken Hill.
Mrs. S. Hartnack, Temporary Clerk, Broken Hill.
W. V. Morony, Agricultural Supervisor, Mumbwa.
A. D. McLeod, Agricultural Supervisor, Serenje.
H. H. Roberts, Agricultural Officer, Chalimbana Government Farm, Lusaka.
Mrs. H. H. Roberts, Temporary Agricultural Supervisor, Chalimbana Government Farm, Lusaka.
J. W. H. Rowlands, Agricultural Supervisor, Chalimbana Government Farm, Lusaka.
E. C. Rose, Agricultural Supervisor, Chalimbana Government Farm, Lusaka.
H. W. P. Nupen, Farm Manager, Mumbwa Pilot Groundnut Scheme, Mumbwa.

Southern Province.

J. D. Yelf, Agricultural Officer, Monze.
R. H. Howard, Senior Agricultural Supervisor, Monze.
T. J. Bembridge, Agricultural Supervisor, Monze Agricultural Training School.
G. J. J. van Rensburg, Agricultural Supervisor, Magoye.
C. S. Mitchell, Agricultural Supervisor, Kanchomba.
P. Lake, Agricultural Supervisor, Kanchomba.
T. Davies, Agricultural Supervisor, Mapanza.
J M. Frew, Agricultural Supervisor, Mapangazia.

Eastern Province.

C. E. Johnson, Chief Agricultural Officer, Fort Jameson.
J. Meade, Clerk, Fort Jameson.
Mrs. A. C. Ketchell, Temporary Clerk, Fort Jameson.
J. H. Rhodes, Agricultural Officer, Lundazi.
A. S. Heaton-Smith, Agricultural Supervisor, Lundazi.
B. L. V. Wright, Agricultural Supervisor, Petauke.
Mrs. E. Gabriel, Agricultural Supervisor, Kalichero.
W. A. Denchfield, Agricultural Supervisor, Chadiza.
P. F. Freeman, Agricultural Supervisor, Katete Agricultural Training School.
D. F. Wallace, Agricultural Supervisor, Katete.

Northern Province.

J. R. E. Hindson, Senior Agricultural Officer, Kasama.
Mrs. M. Miller, Temporary Clerk, Kasama.
I. L. Edwards, Agricultural Supervisor, Kasama.
E. R. Woollard, Agricultural Supervisor, Lunzuwa Agricultural Training School.
B. N. de Vicq, Agricultural Supervisor, Lunzuwa.
E. G. Dabinett, Agricultural Supervisor, Isoka.

On Leave.

J. C. Eyre, Director (pending retirement).
C. J. McK. Krige, Chief Agricultural Officer.
R. B. Symington, Agricultural Officer.
U. J. Moffat, O.B.E., Senior Agricultural Officer (pending retirement).
R. H. Fraser, Senior Agricultural Officer (pending retirement).
T. L. Packer, Agricultural Supervisor (pending resignation).
B. J. O'N. Shepherd, Agricultural Supervisor.
O. J. Gray, Agricultural Supervisor.
J. H. Alder, Agricultural Supervisor.
R. J. Hart, M.B.E., Senior Agricultural Supervisor (pending retirement).
Miss A. M. Taylor, Stenographer.

Department of Agriculture

ANNUAL REPORT FOR THE YEAR 1951

PART I.—AGRICULTURE IN THE TERRITORY.

INTRODUCTION.

The season was noteworthy by being exceptionally difficult; the rains were late in starting and to make matters worse they finished fully a month earlier than usual. In the northern parts of the Territory, the total rainfall for the year was more or less normal, but elsewhere 1950-51 will be remembered by farmers, European and African alike, as one of the worst drought years within living memory. The rainfall was on the average 10 in.—15 in. below normal. In the maize belt, i.e., Chisamba, Lusaka, Mazabuka and Monze, the total rainfall varied between 15 in. and 25 in. for the season. In the Eastern Province, rainfall figures ranged from 25 in. to 35 in. In general, planting was very late and indeed a considerable area of land that had been prepared was never planted at all. Maize farmers were very hard hit financially, although the ultimate figures of deliveries to the Maize Control Board seemed to indicate that the effect of the drought on the crop was not as bad as was originally feared. In the Eastern Province, owing to increased planting, maize production was fortunately greater than in previous years. In the final analysis, therefore, the effect of the exceptionally short season was a reduction of some twenty-five per cent. in the Territory's maize production. Rice was very seriously affected and yields were negligible. The effect on groundnuts and cotton varied greatly from place to place, for example, in the western area groundnuts planted early in December gave more than the average yield. The food position in the native areas was not as bad as might have been expected except in a few chronic famine areas. Cassava came into its own as a famine relief crop and the Government's policy of insistence on its cultivation in native areas was fully justified. Flue-cured Virginia tobacco production reached a record for the Territory owing to the greatly increased area under cultivation. The effect of the drought was reflected in lower yields per acre and the high proportion of low-grade leaf.

2. The effect of a series of years with rather less than average rainfall culminating in this particularly dry year resulted in a general lowering of the water table in most parts of the Territory. Water supplies for drinking purposes became short or non-existent in some parts and irrigated farming suffered a severe set-back. This state of affairs undoubtedly brought home to people on the land the necessity for increased soil and water conservation. In the European farming areas the construction of dams became almost a " priority number one." At the same time there is an increasing realisation that large-scale irrigation schemes based on the big rivers need to be investigated without delay if the country is to meet the ever-expanding requirements of food crops.

3. As usual in drought years some areas were harder hit than others. Many European farmers found themselves in such a parlous state financially that the Government found it necessary to grant drought relief loans. This was arranged through the Land Board with the assistance of the Farmers' Union and the Agricultural Department. A total of eighty-four applications were investigated, of which thirty-seven were approved. Sixteen of the approved loans were in respect of farmers in the Eastern Province.

4. The activities of the Land Board indicated that there was plenty of interest in European settlement in Northern Rhodesia: indeed, there has been an embarrassing number of applications for the limited number of farms available for alienation. The majority of applicants were from the Union of South Africa and most of them seemed to be attracted by the possibility of making money quickly from tobacco growing. The Mkushi block of farms was opened for settlement during the year: this is primarily cattle country with the possibility of a little flue-cured Virginia tobacco and mixed farming. It was indicative of the rise in costs that the Land Board found it necessary to revise the advice given to intending settlers as to the amount of capital required to develop farms at the present time. It is now recommended for example that the absolute minimum capital required for a small tobacco proposition in the Eastern Province is £3,000, and £4,000 for a small mixed farming proposition; in addition, applicants must have a knowledge of farming.

5. Some indication of the rate of development of European farms in the Territory may be obtained from the following figures:

Number of farms and holdings recorded in the census dated 31st October, 1950, were 967, of which more than half were between 1,000 and 5,000 acres in extent.

Since then, to December, 1951, farms alienated were 211. In addition many freehold properties were split up into smaller farms or into sections for leasehold or share-cropping.

6. On the native side, the great increase in the cultivation of land for maize in the areas near the line of rail was no doubt a source of some satisfaction as far as the Territory's food requirements were concerned, but it is alarming from the point of view of soil conservation and land utilisation. It is obvious that many native plough owners in these areas are extending their operations far beyond the scope of traditional land usage. The Department and the native authorities have a big problem here and it is to be hoped that the people will be guided in an attempt to regulate the use of land so as to prevent its further deterioration, and at the same time to safeguard it from exploitation by a few people at the expense of others. By pooling transport charges and paying one price for maize at rural buying depots, it was hoped to prevent the continual drift of people into the native maize growing

areas on the line of rail. The Improved Farming Scheme provides an incentive to the restriction of the acreage planted to maize in so far as a good farming bonus is paid on condition that farmers carry out the rotation of crops, manuring and green manuring. So far, however, less than ten per cent. of cultivators in these areas have registered as improved farmers.

7. Soil and water conservation were brought more into the picture during this year for reasons that have already been mentioned. The severity of the drought convinced many farmers, one might almost say they were convinced "the hard way," that conservation is essential. The Natural Resources Board provided a free grant up to one-third of the cost of approved dams and weirs and encouraged the formation of intensive conservation areas under the Ordinance. At the same time the Conservation Section of the Department was able to extend the scope of its activities. In the native areas the tempo of conservation was increased due to the steadily growing extension services of the Department.

8. The only major change in crop prices was in regard to maize. The price paid by the Maize Control Board for the 1950-51 crop was controlled at 35*s*. per bag of 200 lb. net weight as compared with 30*s*. 2*d*. in the previous year. The controlled price of groundnuts remained unchanged at £45 per short ton of kernels. Some record prices were obtained for tobacco, but this was off-set at later sales by relatively low prices for low and medium grades. Increases in the prices for livestock and pastoral products were obtained which should go some way towards encouraging mixed farming,

9. The labour problem on European farms was not as great as in the previous year, probably because of the poor maize harvest and the general effect of the drought. Nevertheless labour continues to be a limiting factor. In order to increase the supply of labour, the Northern Rhodesia Farmers' Union, through the Agricultural Development Society, operated a labour recruiting organisation called Northern Trust Limited.

10. Mechanisation of agriculture was continued on an ever-increasing scale on European farms. The supply of spare parts was very bad for the most part but towards the end of the year there were indications that at least two of the big manufacturers intended to put the spares position to rights. There is little doubt that the extremely rapid development of farming in this country must be dependent on mechanisation, but it must also be apparent that the cost of this development may be out of all proportion to the real agricultural value of the land. The enormous costs of mechanisation, together with big financial commitments on soil and water conservation, are undoubtedly making for a degree of over-capitalisation that must make for high costs of production of food and other crops.

11. The effect of the world shortage of sulphur on the Territory's fertilizer supplies was not obvious to the average farmer. To a few discriminating farmers, however, the substitution of super and raw phosphate with only ten point five per cent. water soluble phosphate in place of the usual straight superphosphate with nineteen per cent. water soluble phosphate was a serious matter. How serious it was, however, is difficult to judge because of the lack of experimental evidence as to the relative effects of the two kinds of fertilizers on maize yields under local conditions. The companies in Salisbury did try to improve their distribution, but it will never be satisfactory until mixing and bagging can be decentralized to the stage when a plant is located in Northern Rhodesia. A subsidy of £1 6*s*. 0*d*. per ton was paid by the Government to off-set the rise in the price of phosphate fertilizers used for maize production.

12. The Second Annual Congress of the Northern Rhodesia Farmers' Union was held on August 30th and 31st, 1951. The opening address was given by the Governor of Northern Rhodesia, Sir Gilbert Rennie. William Wroth, Esq., O.B.E., presided. The agenda was a lengthy one covering nearly every aspect of European agriculture. A high standard of debate was maintained and the general tone was one of reasonable and constructive criticism.

13. A notable event in the history of agriculture and of tobacco in particular in the Territory was its representation by the Government Tobacco Adviser, Mr. J. C. Collins, at the World Tobacco Congress at Amsterdam in September, 1951. Samples of flue-cured Virginia tobacco from both Eastern and Western areas, of Turkish from the Western area and of Burley tobacco from the Eastern area were exhibited. The exhibit in general, including the flue-cured Virginia tobacco in particular, was extremely favourably commented on by the trade buyers. Mr. Collins was selected to assist in drafting a constitution for a proposed World Tobacco Organisation.

14. The Northern Rhodesia Agricultural Society's annual show was held on August 7th and 8th—the first to be held at the new showground in Lusaka. Sir Godfrey Huggins, Prime Minister of Southern Rhodesia, made the opening address. The weather, however, was cold and the wind raised clouds of dust. There was a fair turn-out in the livestock sections and the handwork and needlecraft sections were good, but on the agricultural side the exhibits were disappointing.

Maize.

15. There was some reduction in the area planted to maize by European farmers in the Western area; this was probably due to the weather conditions being unfavourable at planting time. Yields were low but a greater proportion than usual was sold off the farms, partly because of the fact that it paid farmers to sell grain and buy the labourers' rations in the form of meal at the subsidised price.

MAIZE PRODUCTION ON EUROPEAN FARMS.

Season	*Acreage planted*	*Estimated total crop reaped (bags)*	*Estimated bags per acre reaped*
1946-47	55,889	281,368	5.0
1947-48	65,800	435,000	6.6
1948-49	74,040	370,500	5.0
1949-50	105,000	572,000	5.4
1950-51	98,265	399,450	4.0

The point made in last year's report regarding the wide fluctuation in the deliveries of native maize according to the season was borne out very clearly in 1951. There was undoubtedly a big increase in the area planted in the native reserves but deliveries were considerably reduced.

TOTAL MAIZE PRODUCTION FOR SALE IN THE RAILWAY BELT FOR THE CALENDAR YEARS.

(Thousands of bags of 200 lb.)

Year	*European grown*	*African grown*	*Total*
1944	212	115	327
1945	273	202	475
1946	268	172	440
1947	190	54	244
1948	343	296	639
1949	283	61	344
1950	447	344	791
1951	399	290	689

16. The maize consumption requirements of the Maize Control Board were estimated at 840,000 bags, as compared with 720,000 bags in the previous year, i.e., an increase of sixteen per cent.

17. In the Eastern Province all maize which came on the market was native grown.

MAIZE MARKETED IN THE EASTERN PROVINCE.

(Bags of 200 lb.)

Year	*Local production*	*Imports*	*Total*
1949	30,500	22,500	53,000
1950	48,000	12,000	60,000
1951	80,000	Nil	80,000

(Note the 1949 and 1950 figures revised.)

The annual requirements for consumption in the Eastern Province were estimated at 54,000 bags. There was a carry-over of some 6,600 bags from the 1950 season which, added to the 1951 crop, gave an estimated surplus of 32,000 bags. Arrangements were made for a substantial part of this surplus to be sold to the Maize Control Board, leaving only as much carry-over as could be stored locally. Steps are being taken to provide more and better storage facilities in the Eastern Province.

18. The controlled price paid by the Maize Control Board at line of rail depots was 35*s.* 0*d.* per bag, i.e., an increase of 4*s.* 10*d.* per bag over that of the previous year. (The increase was concluded in two stages: first from 30*s.* 2*d.* to 32*s.* 6*d.* and later, on representations by the farming community through the Northern Rhodesia Farmers' Union, from 32*s.* 6*d.* to 35*s.* 0*d.* The second stage was related to the effect of the drought on the returns to the farmers.) Recent price changes may be summarised as follows:

1948 ... ... 25*s.* 8*d.* per 200 lb. *in*cluding cost of bag.
1949 ... ... 27*s.* 0*d.* per 200 lb. *ex*cluding cost of bag.
1950 ... ... 30*s.* 2*d.* per 200 lb. *ex*cluding cost of bag.
1951 ... ... 35*s.* 0*d.* per 200 lb. *ex*cluding cost of bag.

19. Native producers in the areas scheduled under the Maize Control Ordinance, which comprise in effect all native areas within easy reach of the railway line, received 25*s.* 3*d.* per 200 lb. bag at all depots. In point of fact, the Maize Control Board pays the same price, i.e., the controlled price, for all maize irrespective of whether it is European or native produce. As far as the native maize is concerned, however, part of the price, after deducting rural buying expenses, is paid into the African Farming Improvement Fund. Out of this fund bonuses were paid to native growers who qualified as "Improved Farmers." The bonus payments were increased this year from 18*s.* 0*d.* to 21*s.* 0*d.* per arable acre for the first-class and smallholder grades and from 9*s.* 0*d.* to 12*s.* 0*d.* per acre for second-class grade.

20. In the Eastern Province the price was increased from 10*s.* 6*d.* per bag (9*s.* 0*d.* in Lundazi district) to 13*s.* 6*d.*, plus 1*s.* 6*d.* which was credited to an African Farming Improvement Fund. The heavy cost of road transport and of operating a large number of small buying stations scattered over the province brought the selling price to the consumer up to 32*s.* 0*d.* per bag at Fort Jameson, with rebates at certain depots nearer the producing areas, equal to the difference in transport cost between delivery at the depot and delivery at Fort Jameson. Marketing continued to be controlled by the Eastern Province Maize Pool. It is anticipated that this voluntary control will be placed on a statutory basis by next season.

Wheat.

21. Lack of irrigation water due to the drought aggravated the steady decline in wheat production which is clearly shown in the following figures:

WHEAT PRODUCTION FOR SALE.

(Tons of 2,000 lb.)

1945	2,550
1946	2,475
1947	500
1948	900
1949	150
1950	325
1951	84

Against this diminishing production, the Territory's consumption requirements appear to be increasing rapidly. It is estimated that 13,434 tons of wheat were consumed this year as compared with 11,000 tons last year. The price for locally grown wheat continued to be controlled at 56*s.* 0*d.* per bag of 200 lb. The Northern Rhodesia Farmers' Union have, however, taken up the question of an increase in the price to bring it more in line with the cost of imported wheat and to encourage farmers to take more interest in the crop.

Tobacco.

22. Considerable expansion in the flue-cured tobacco industry was recorded during the season 1950-51, when production in the Eastern area rose from 3,214,000 lb. in 1949-50 to 4,413,894 lb. in 1950-51, and in the Western area from 2,956,000 lb. to 6,262,567 lb.

23. The crop grown in the Eastern area was sold over the tobacco auction floors at Fort Jameson and averaged 37.053 pence per lb. Flue-cured tobacco from the Western area was sold over the Salisbury auction floors at an average price of 38.18 pence per lb. The Southern Rhodesia Tobacco Marketing Board referring to the Northern Rhodesia Western crop stated in its annual report that " despite localised drought conditions, the quality of the crop showed a great improvement on previous years while the grading and handling was distinctly better."

24. During the first part of the sales season, prices remained attractive to the seller, but from the middle of June onwards there was a severe decline in the prices being paid for low-grade leaf and this recession was felt to some extent, but not severely, in the medium grades. One of the primary causes of the decline was the comparatively high proportion of low-grade leaf featuring in the Southern and Northern Rhodesian crop due to drought conditions in the field. The following table gives an idea of the trend of the sales in Fort Jameson:

FORT JAMESON TOBACCO SALES, 1951.

(Flue-cured leaf.)

	S.A. Quota	*Non-Quota*
1st Sale: 4—8th June	372,303 lb. at 83.396*d.* per lb.	862,220 lb. at 49.918*d.* per lb.
2nd Sale: 9—13th July ...	—	1,365,042 lb. at 38.481*d.* ,, ,,
3rd Sale: 13—17th Aug. ...	—	1,211,877 lb. at 22.984*d.* ,, ,,
4th Sale: 4—7th Sept.	—	602,452 lb. at 15.062*d.* ,, ,,
TOTAL ...	372,303 lb. at 83.396*d.* per lb.	4,041,591 lb. at 32.783*d.* per lb.

25. The production of Burley tobacco declined from 327,100 lb. in 1949-50 to 252,879 lb. in 1950-51. The average price realised was 20.47 pence compared with 26.69 pence the previous season. As hitherto, the crop was sold over the auction floors at Fort Jameson.

26. The Turkish tobacco industry continued to decline to the very low figure of 49,368 lb. As the crop is sold by private treaty no exact figures are available as to price but the average was in the neighbourhood of 34 pence.

27. The progress of the tobacco industry is depicted in the following table:

TOBACCO PRODUCTION.

(in lb. weight.)

Season	*Flue-cured Virginia*			*Other Virginia*	*Burley*	*Turkish*		*Total all*
	E.A.	*W.A.*	*Total*	*(a)*	*(a)*	*E.A.*	*W.A.*	*Types*
1943-44 ...	2,058,000	240,000	2,298,000	†	54,000	†	80,000	2,432,000*
1944–45 ...	2,207,000	243,000	2,450,000	31,000	85,000	20,000	403,000	2,989,000
1945–46 ...	2,823,000	307,000	3,130,000	43,000	77,000	28,000	1,000,000	4,278,000
1946–47 ...	2,928,600	500,000	3,428,600	82,000	125,000	26,500	1,000,000	4,662,100
1947–48 ...	2,988,000	781,500	3,769,500	†	140,000	—	585,590	4,495,090*
1948–49 ...	4,076,300	1,691,600	5,767,900	†	178,800	—	97,000	6,043,700*
1949–50 ...	3,214,500	2,956,500	6,171,000	42,500	327,100	—	115,330	6,655,930
1950–51 ...	4,413,894	6,262,457	10,676,351	50,000	252,879	—	49,368	11,028,598

NOTE.—(*a*) = Production confined to Eastern Area.
E.A. = Eastern Area.
W.A. = Western Area.
†n = ot obtainable.
* = incomplete.

Beans and Cowpeas.

28. With the exception of the Lundazi district of the Eastern Province and parts of the Northern Province, it was generally a very bad year for beans and cowpeas. Indeed, in most parts of the Territory crops were a complete failure due to the early cessation of the rains, and as a result seed was in extremely short supply for next season. In Lundazi district some 1,200 bags of beans and 300 bags of cowpeas came on the market at prices to the grower of 30*s.* and 24*s.* per bag respectively.

Rice.

29. In Barotseland the production of rice was increased substantially but the territorial picture was one of failure due to drought. In the Northern Province birds and mice took a heavy toll of the crop on the shores of Lake Bangweulu. In the Eastern Province the total crop was estimated at 1,200 bags of hulled rice only, as compared with some 2,500 bags in the previous year. In Barotseland production was increased to 1,407 bags of paddy as compared with 566 bags last year: of the total produced, 1,155 bags of paddy were marketed. Under controlled conditions including transplanting from nurseries, for example in Bangweulu-Luapula and in Barotseland, good yields were obtained.

At Namushakende in Barotseland the average yield of the experimental plots was 3,198 lb. paddy per acre. Marketing in general continued to be extremely unsatisfactory. An investigation into this aspect indicated that the local rice was of relatively very poor quality due to bad preparation as compared with imported rice. Strenuous efforts are now being made by the Department to improve quality by standardization of varieties, levelling so that water can be maintained at an even depth, and installation of proper machinery for milling at suitable centres.

Sorghum.

30. Sorghum is the staple food crop in the Luangwa Valley of the Eastern Province and in parts of the Northern and Western Provinces. Crops were good in the Eastern Province but rather below average elsewhere. An increased area was planted to sorghum in the Fort Rosebery district. In the European areas on the railway line, several European farmers planted trial areas of sorghum types suitable for harvesting by combine. It is anticipated that there will be more interest in this crop if a type can be demonstrated that will withstand the depredations of the birds. Sorghum was not a controlled commodity except in so far as the Provincial Administration regulated the disposal of the crop so as to avoid hunger in the villages. Prices to growers at rural buying posts varied from 3*s.* 0*d.* to 4*s.* 0*d.* per 32 lb., i.e., about 18*s.* 0*d.* to 24*s.* 0*d.* per 200 lb.

Finger Millet.

31. This is an important crop in connection with the " Chitemene " or burnt gardens system of subsistence agriculture in the Northern and Western Provinces, in the northern part of the Central Province and of the Lundazi district in the Eastern Province. On the whole crops were good.

Cassava.

32. The cultivation of cassava is encouraged in the native areas throughout the Territory as a famine reserve crop. In parts of the Northern and Western Provinces, however, cassava has been a staple crop for many years. More than 1,500 tons of cassava flour were sold in the Western Province alone (Fort Rosebery, Kabompo and Balovale). The Maize Control Board purchased 575 short tons of Northern Rhodesian cassava meal on the Copperbelt at about £18 per ton. It may be said that the crop came into its own during this difficult drought year and fully justified the persistence of the Provincial Administration and the Department in recommending its cultivation. From time to time in recent years fears have been expressed that the people in Fort Rosebery and one or two other places rely too much on cassava from the point of view of dietetics. The Department is taking steps to diversify the agriculture in these districts as far as possible without, however, upsetting the production of cassava to any extent. Growers received 2*s.* 0*d.* to 2*s.* 6*d.* per 24 lb. at rural depots in the Northern Province.

Potatoes and Onions.

33. There was an increase in production of both potatoes and onions on European farms especially near Lusaka. Indeed, the production of onions was such that several farmers had considerable quantities that went bad because they could not be sold. The move towards the formation of a co-operative marketing scheme has made some progress, but it is not expected that it will come into operation until marketing, including importation, can be controlled under comprehensive marketing legislation with a fully representative board. The price to growers for potatoes was £2 per bag of 150 lb., more or less, and for onions, £2 per bag of 120 lb.

Cotton.

34. In the upper Luangwa valley the Department's efforts to resuscitate the native production of Nyasaland type upland cotton received a set-back due to the drought. The average yield was only 230 lb. seed cotton per acre. From the established areas of production, 29,000 lb. of seed cotton was purchased from 300 growers and a further 4,000 lb. came from fifty pilot plots in new areas at the northern end of the Lundazi district. A summary of production in recent years is as follows:

	lb. Seed Cotton
1949	7,800
1950	31,000
1951	31,000

The crop was ginned and packed into hand-pressed bales by the Department on behalf of the African Co-operative Society that handles the marketing. 10,035 lb. clean lint and 1,294 lb. stained lint were produced. Of this, 8,958 lb. clean lint was exported to South Africa at thirty pence per lb., while the balance of the lint was sold locally at from twenty-four pence to twenty-seven pence per lb. The Department is continuing strenuously to build up this industry and a considerable increase in production is confidently expected next season.

35. In the Western area one European grower at Mazabuka did very well with cotton from Gatooma seed. Similar seed grown in experimental plots on Agricultural Stations gave yields of 200 to 492 lb. seed cotton per acre. The position now is that many European farmers have planted considerable acreages; indeed, the total amount of seed ordered from Gatooma by seventy-eight farmers would have been enough to plant some 4,000 acres for 1951-52. The actual area planted for the 1951-52 season was probably about 2,000 acres in the Western area.

Groundnuts.

36. Apart from moderately successful crops in two areas, namely at the Pilot Groundnut Scheme at Mumbwa and on groups of peasant farms at Katete, the general picture was of failure, due mainly to drought. At Petauke where groundnuts are an important crop only 1,040 bags of kernels were sold to the Co-operative Marketing Union, compared with 2,253 bags in 1950, 1,300 bags in 1949 and over 6,000 bags in 1948. The price to growers in Petauke and Katete was 51*s.* 0*d.* per bag. At the

Pilot Groundnut Scheme yields of over 1,000 lb. kernels per acre were recorded for the areas planted early in December but in the later-planted areas yields fell away badly, e.g., the last field planted in the middle of January gave only 300 lb. per acre. The average yield was 500 lb. per acre for the 400 acres. The Territory's total production for sale was probably little more than 500 tons. The price was controlled at £45 per ton of kernels on line of rail.

37. Many European farmers showed a keen interest in the Government's Pilot Groundnut Scheme and there is no doubt that at least one important result of the Scheme has been to stimulate an interest in the cultivation of groundnuts as a rotation crop on European farms, both maize and tobacco. In addition there is an increasing interest in groundnuts as a cash crop in the neighbouring native areas.

Sugar Cane Pilot Scheme.

38. After more than two years of investigation and discussion the Native Authority agreed to co-operate and the Government voted a sum of money for the purpose of developing a pilot sugar cane plantation of up to 350 acres in the Gwembe Valley, i.e., on the north bank of the Zambezi River some ten miles up river from Chirundu. Water will be pumped from the river for the irrigation. The scheme is expected to take three years before results can be obtained on which to base a decision as to whether a larger scheme would be economic. As the season was well advanced before the pilot scheme was approved, it was only possible to carry out a survey to demarcate the proposed site of the pilot scheme. A start will be made on clearing early in 1952. The Rhodesia Sugar Refinery is carrying out the experiment on behalf of and under the supervision of the Department.

PART II.—THE WORK OF THE DEPARTMENT.

General Policy.

39. The first and most important task of the Department is to devise ways and means of achieving greater self-sufficiency in food crops. This task will continue to be of paramount importance for many years to come, but at the same time every endeavour is being made to develop agriculture generally on sound permanent lines. Although the Agricultural Department confines its attention largely to the cultivation of the land and the production of crops, it is inevitable that close attention is given to the integration of animal husbandry with crop husbandry.

40. On the native side, through the medium of Agricultural Stations and the extension services, policy is aimed at preventing famine, increasing the productivity of the land and the productive capacity of the people. Contour farming, the introduction of new crops and improved methods of agriculture are all " grist to the mill." It has to be remembered that over a large part of the Territory, particularly in the north, it is a case of teaching the people simple agriculture as an alternative to the present wasteful system of felling and burning the rapidly diminishing forests. A scientific approach to the utilisation of swamps in certain areas promises well for the production of rice. The production of maize, groundnuts, beans and cotton is rapidly and surely being increased beyond a purely subsistence level, to provide a rising standard of living for the people.

41. On the non-native side, the policy and functions of the Department extend to the construction, on repayment, of dams for water conservation, anti-erosion works, and bush clearing by fully mechanised conservation units. There are, in addition, albeit inadequate at present, advisory and research services on soils, fertilizers, crop and fruit production, crop pests and diseases, pasture management and research, designed to intensify farming and generally to improve the efficiency of the farming community.

42. As far as the structure of the Department is concerned, European and African agriculture are closely integrated. Some officers may be concerned mainly with the European side while others may be mainly on African work but there is no division of the Department for this purpose.

Organisation and Staff.

43. The Department is organised on the basis of a headquarters administration, working through a senior officer in each of the five provinces and Barotseland and thence through Agricultural Officers or Supervisors based on district stations and development centres. At the business ends of the extension services there are African Agricultural Assistants and African Capitaos. Ancillary to the main framework of the Department there are: (i) The Research Services with a Central Research Station being built nine miles from Lusaka. The Research Staff comprises two Soil Chemists only, but there will be other specialist officers in due course. (ii) Chief Conservation Officer and three Conservation Officers who plan conservation works, mainly on European farms, and an array of Caterpillar D8, D7 and D6 tractors and equipment under the direction of a staff of European Mechanical Supervisors. (iii) The Tobacco Advisory Services under a Tobacco Adviser with an Assistant Tobacco Adviser and one Agricultural Supervisor on extension work and one Supervisor at each of the two tobacco experimental stations, namely, at Choma and at Fort Jameson.

44. To maintain this organisation in the field was not easy owing to the difficulty of obtaining and keeping staff and it was impossible to achieve the desired standard of efficiency owing to lack of experienced and qualified officers.

45. The strain on the few experienced officers was recognised through the establishment this year of two new super-scale posts of Chief Agricultural Officer. C. J. McK. Krige and C. E. Johnson were promoted to these posts as from 1st January, 1951.

There was, however, no improvement in the number of senior officers. On the contrary, the Department sustained a severe set-back about the middle of the year through the retirement of the Director, J. C. Eyre, and the two most experienced Senior Agricultural Officers, U. J. Moffat, O.B.E., and R. H. Fraser. M. Halcrow, O.B.E., Deputy Director, was Acting Director from 20th June till the end of the year.

46. E. M. Clegg, Soil Scientist, was appointed and arrived in the Colony on 2nd December. J. Mackenzie, Conservation Officer, was appointed and assumed duty on 22nd September. One Agricultural Supervisor retired, two Agricultural Supervisors resigned and one was transferred during the year. On the credit side, nine supervisors were appointed and one Agricultural Supervisor experienced in tobacco was promoted to a post of Assistant Tobacco Adviser. There was an improvement in the Head Office staff through the creation of a post of Office Superintendent and the appointment of a male clerk to deal with conservation accounts.

47. The African staff was increased in number slightly, but there was still a severe shortage of trained Assistants. The output from the Agricultural Training Schools was insufficient to supply the demand for these men in the field.

The Pilot Groundnut Scheme.

48. The results of the Pilot Groundnut Scheme were on the whole most encouraging. The financial statement shows a loss of some £300, but against this the substantial sum of £1,000 was allowed for depreciation. The average yield was 500 lb. kernels per acre from the 400 acres. Considering the short season and the fact that planting was continued from 20th December till 16th January, which in the circumstances was rather late, the out-turn was quite satisfactory. Yields of over 1,000 lb. kernels per acre were recorded from the earliest planted fields.

49. As far as the second season is concerned it is feared that the weather was too wet for groundnuts. The bush clearing unit of the conservation services which was due in August was delayed and did not get to the Scheme until December when it broke down soon after arrival. As a result, the proposed 200 acres of new land were not prepared in time. Planting was therefore restricted to the 400 acres previously planted, plus a few acres only of new land instead of 600 acres as planned. Excessive rain caused tractors to be bogged down and conditions generally were extremely adverse.

50. The cattle side of the Scheme has recovered after several early set-backs. Thirty of the original 100 head of stock died from a variety of causes (plant poisoning, marauding lions, heartwater and streptothricosis). The first calves have been born at the Scheme, and on the whole the cattle were looking very well by the end of the year.

Conservation.

51. In the European areas the work was carried out by the Conservation Services of the Department: a full report by the Chief Conservation Officer is given in an Appendix to this report. Good progress was made in organising the farming belt into Intensive Conservation Areas under the Natural Resources Ordinance. This is following the system that has proved satisfactory in Southern Rhodesia. The administrative side of this work devolved largely on the Chairman and Secretary of the Natural Resources Board, who worked in close co-operation with the Chief Conservation Officer. The local committees—called Intensive Conservation Area Committees—were all extremely keen and their enthusiasm was most encouraging.

52. The work of the Conservation Services in the European areas may be summarised briefly as follows:

Apart from the overall supervision by the Chief Conservation Officer, the three Conservation Officers paid 834 visits to 175 farms. This was partly in connection with the supervision of work being done by the conservation mechanical units, and partly advising on conservation work undertaken by the farmers themselves with their own equipment. The conservation mechanical units accomplished the following works during the year:

Soil conservation works on	2,870 acres
Land prepared for irrigation	65 ,,
Bush clearing	1,344 ,,
Road traces and fire-breaks	23 miles
Watershed protection including dams	350 acres
Number of dams for water conservation	18
Water-holding capacity of 18 dams	243,600,000 galls.

Careful cost accounts were kept of all these works which were debited to the farmers concerned.

Full details of the costings are given in the Appendix.

53. In the Eastern Province, in addition to his tobacco advisory duties, the Assistant Tobacco Adviser marked out contour ridges on 1,700 acres of European farming land.

54. In the native areas conservation is part and parcel of the Department's extension work. From the record of achievement during the year it is clear that good progress was made:

SOUTHERN PROVINCE.

Level contour ridges constructed by tractors with disc terracers:

	miles
Mapanza and Macha	250
Mapangazia	255
Magoye...	20
Kanchomba	10
Total for the Year ...	535

Grass strips on the contour:

	miles
Mapanza	50
Kanchomba	133
Monze	832
Magoye...	250
Total for the Year ...	1,265

Graded terraces made by improved farmers for special purposes:

	miles
Kanchomba	3
Magoye...	4
Total for the Year ...	7

Sub-soiling by tractor was successfully carried out in Mapangazia and Kanchomba and as a result this work will be extended to many areas of badly tramped-out and over-grazed grassland on steep slopes. At Mapangazia three small dams and four weirs were constructed. At Magoye an earth dam, 200 yards long and fifteen feet high, was completed at Civuna. Several dams in Monze and Kanchomba were strengthened and the spillways made safe.

Central Province.

55. 1,700 acres were disc-terraced by tractor in the southern half of the province.

Eastern Province.

56. Level contour ridges were marked out by the African extension staff and broad ridges were dug by the garden owners before planting. (Note.—In subsequent years these ridges are enlarged and the garden owners are also encouraged to plant on ridges parallel to the contours instead of in mounds.) Six hundred villages were brought under contour cultivation during the year and contouring was maintained in 1,300 villages previously started. The picture to date is as follows:

	No. of villages contoured	*Estimated area in 1951 (acres)*	*Total No. of villages contoured to date*
Katete	136	20,000	443
Kalichero	18	—	369
Chadiza	54	10,000	232
Petauke	251	25,000	560
Lundazi	172	22,000	291
	631	over 77,000	1,895

Most of the plateau area of the province has now been brought under contour cultivation.

Northern Province.

57. Contour ridging at three-foot vertical intervals has been going on for many years in the dug gardens in the north of the province as well as in certain of the old reserves. It has been shown that this work must be extended to areas near Kasama and elsewhere and as the Native Authority rules were considered inadequate, steps were taken this year to convince the authorities concerned so that the work may be accelerated throughout the province. An Agricultural Supervisor was posted to the Inamwanga Reserve to deal especially with the erosion and rehabilitation problems there. Agricultural Kapasus and all concerned used their influence to enforce "early burning" which is the main conservation measure practised in the province and on the whole it was carried out satisfactorily.

Western Province.

58. Here, too, "early burning" was the main conservation measure and it was carried out quite well throughout the province. The re-aligning of African township plots on the Copperbelt was put in hand as a special project. Agricultural Capitaos pegged 82,400 yards of contour lines of which 10,489 yards were constructed. In the Ndola resettlement area, fourteen African Assistants were engaged in marking out gardens on the corridor system, i.e., controlled shifting cultivation on the contour. Thirty-seven of the 184 villages were started on these lines. At Kabompo and Chitokoloki, nine miles of contour ridges were constructed. In Fort Rosebery, school gardens were contoured and cultivation was prohibited within thirty paces of some water courses.

Barotseland.

59. At Namushakende, 260 yards of contour ridges were constructed. Drainage and flood control occupied a good part of departmental officers' time.

Extension Services for European Farming.

60. The Chief Agricultural Officers at Fort Jameson and Ndola devoted quite half their time to European farmers and farming matters. The senior officers in the Central and Southern Provinces also devoted part of their time to European advisory work. In particular, however, an Agricultural

Supervisor based on Chalimbana Agricultural Station was working during the latter half of the year whole-time on visiting and advising European farmers on mixed farming problems. This officer visited 167 farmers and travelled some 5,000 miles. The Soil Chemist also visited a number of European farms in an advisory capacity.

61. Despite the loss of Mr. R. H. Fraser on retirement, and the greatest difficulty in recruiting suitably qualified officers, some improvement was made in building up the Tobacco Advisory Services of the Department. The Tobacco Adviser (Mr. J. C. Collins), who joined the Department in September, 1950, managed to combine a great deal of touring and advisory work with his departmental responsibilities. He could only do what was required, however, by meeting tobacco growers in groups and visiting individual farms when specially requested. Some 250 visits to farms were made and, as far as he was aware, every request was answered. Mr. Collins was most successful in exhibiting samples of Northern Rhodesian leaf at the World Tobacco Congress at Amsterdam in September: it was ranked amongst the best tobacco on exhibition.

62. In the Southern Province an *ad hoc* arrangement was made whereby an Agricultural Supervisor from our Mochipapa Tobacco Station was posted whole-time to visit new or inexperienced tobacco growers. In the Eastern Province where a similar arrangement had been in operation for some time, the Agricultural Supervisor concerned was confirmed in the post with the title of Assistant Tobacco Adviser. Many inexperienced growers had difficulty in meeting the adverse weather conditions. Yield and quality of leaf were depressed by such faults as planting overgrown seedlings, running successive plantings too close together, over-packing barns, picking over-ripe leaf as well as by lack of weeding and bad cultivation early in the season sometimes through lack of labour. Curing technique was a weak point on many farms; inexperienced growers found difficulty in adjusting themselves to the heavier body in this year's leaf as compared with last year's. By assisting with these and many other problems the Tobacco Advisers contributed a good deal to the tobacco industry.

63. The Tobacco Adviser initiated discussions in both Eastern and Western areas on the revision of the tobacco marketing legislation and on the tobacco sections of the Plant Pests and Diseases Regulations. The programme of experimental work at Mochipapa and Msekera was revised and expanded. Special attention was given to crop estimation and in the Eastern Province the result was very near the mark. At Msekera, 58 lb. of tobacco seed was sold to farmers and in addition 303 lb. of farmers' own seed was cleaned, disinfected and tested for germination. At Lusaka, the Tobacco Adviser cleaned, treated and tested 17 lb. of farmers' own seed.

64. A small but important part of the Department's extension work was carried out in the newly-opened Mkushi Block of Crown Land farms Here, a retired Senior Agricultural Officer was appointed on a part-time basis to carry out the Department's recommendations on his own farm and to communicate the advice to other new farmers in the block. By this means, the Tobacco Adviser has been able to test out his advice in relation to the rather special conditions that obtain in this part of the Territory and the results have already proved extremely useful.

65. It is worth recording here that tobacco growers were showing more interest in mixed farming including ranching cattle, the planting of groundnuts and maize in rotation and the use of grass leys.

Extension Services for African Agriculture.

66. In addition to conservation work which is inseparable from agricultural extension work in native areas, contact with the cultivators in their villages was maintained as far as possible over the greater part of the Territory. Extension Officers including Agricultural Officers and Supervisors were based on the following stations:

(number of officers in brackets)

Northern Province	...	Lunzuwa (1), Isoka (Old Fife) (1), Kasama (2).
Western Province	...	Kawambwa (1), Fort Rosebery (1), Ndola (2), Kambowa (1), Kabompo (1).
Central Province	...	Serenje (1), Broken Hill (2), Mumbwa (1), Chalimbana (1).
Southern Province	...	Mapangazia (2), Magoye (1), Monze (2), Kanchomba (2), Mapanza (1).
Eastern Province	...	Lundazi (2), Fort Jameson (1), Kalichero (1), Katete (1), Chadiza (1), Petauke (2).
Barotseland ...	...	Namushakende (2).

Ten of these stations—they are really permanent base camps for the extension work—were established with financial assistance under the Colonial Welfare and Development Act in respect of both Capital and Recurrent expenditure. Some of the stations are still under construction and new stations have been planned.

67. There is no satisfactory way of measuring or assessing the achievement of the less spectacular aspects of extension work. These included village to village touring, distribution of seeds, construction of many miles of village roads, demonstrations of better cultural methods, chitemene control, i.e., the rationalisation of tree cutting for finger millet gardens as practised in the northern parts of the Territory, the survey and investigation of possible resettlement areas, intensive agricultural development for tsetse fly control, visits to leper settlements and prison farms, training courses in agriculture and a hundred and one routine jobs. There were aspects of the work, however, in which the results were obvious or could be counted, e.g., peasant farming schemes, and these are referred to here under their respective heads.

Improved African Farming Schemes.

68. This heading is now in the plural because there are in fact three such schemes in operation, i.e., two new schemes in addition to the original scheme that has been operative for some years in the Maize Control Board areas. The new schemes were started (i) in the Eastern Province in connection with the Maize Pool and (ii) in Namwala–Mbeza area of the Southern Province in connection with a maize marketing experiment being carried out under the Registrar of Co-operative Societies.

69. In order to make the position clear, it must be understood that the Improved African Farming Scheme is financed from an African Farming Improvement Fund. This fund is maintained from the annual cash balances on the Native Maize Pool operated by the Maize Control Board. The fund is administered by a representative committee of which the Director of Agriculture is chairman, and there are two African members. The use of the fund is restricted to the areas scheduled under the Maize Control Ordinance. Money was spent on providing permanent storage sheds at rural depots, supplying platform scales and balances at rural depots and villages, subsidizing ox carts on a pound for pound basis, purchasing machinery for shelling groundnuts, purchasing and distributing green manure seeds, purchasing tractors and machinery and providing the running costs in connection with soil conservation, construction of wells and dams, and on bonuses to Improved Farmers.

70. African farmers who undertook to carry out improved methods of agriculture as approved by the Department received bonus payments at the following rates:

	Per acre of arable land
First Class	21*s.* 0*d.*
Second Class	12*s.* 0*d.*
Smallholder Class	21*s.* 0*d.*

SUMMARY OF "APPROVED" IMPROVED FARMERS, 1951.

	First class	*Second class*	*Smallholder*	*Total*
Monze	77	48	—	125
Mapanza	11	17	—	28
Kanchomba...	134	102	4	240
Magoye	29	17	13	59
Mapangazia	3	—	—	3
TOTALS ...	254	184	17	455

The total includes fourteen school gardens which were all first class.

The total bonuses paid out amounted to £6,515 8*s.* 9*d.*

The scheme was introduced into the Central Province only this year so that payments were confined to the Southern Province. Next year, however, the distribution will be much wider. The numbers of farmers registered in each district in 1951 for the 1951-52 season, with the acreage of land involved, were as follows:

	No.	*Total area (acres)*	*Average size of farm (acres)*
SOUTHERN PROVINCE:			
Kanchomba	373	6,177	16.5
Monze	227	5,000	21.0
Mapangazia	6	97	16.0
Mapanza	59	673	11.5
Choma	20	365	18.2
Magoye...	142	852	6.0
CENTRAL PROVINCE:			
Sala	31	530	—
Sola wa Manyika	5	374	—
Sola wa Manyika (North) ...	1	120	120.0
Sola wa Manyika (South) ...	12	476	40.0
Soli Reserve (East)	11	200	18.0
Kembe...	3		
Mumbwa	4		
TOTALS ...	894	over 15,264	

The supervision of this scheme involved an immense amount of work. In addition to this, the officers concerned organised the distribution of fertilizers, seeds and ox carts. For example, in the Southern Province 3,033 pockets of super and rock phosphate fertilizer were obtained and sold through the co-operation of the Maize Control Board, fifty-four ox carts were sold at the subsidized price and thirty-five spring balances were distributed to villages. The scales—capable of weighing up to 300 lb. —were particularly appreciated by the cultivators and more scales have been requested for next year. In the Central Province, the Agricultural Officer, Chalimbana, distributed 486 pockets of fertilizer, 116 sacks of sunnhemp, green manure seed, twenty-two sacks of shelled groundnut seed, twelve sacks of velvet beans for green manure and three sacks of cowpeas. Eleven ox carts were sold at the subsidized price.

71. In the Southern Province some interesting observations were made on the results of the scheme by comparing the maize yields on adjacent improved and unimproved farms with the following results:

AVERAGE YIELD OF MAIZE IN BAGS (200 lb.) PER ACRE.

	First class	*Second class*	*Smallholder*	*Unimproved*
Magoye	13.5	7.6	17.1	4.5
Monze	9.8	8.8	—	4.25
Mapanza	7.6	—	—	2.8
Macha	5.5	—	—	3.7
Kanchomba ...	8.9	—	—	3.2

It was observed that the yields varied as the soils and the rainfall but, by and large, the improved farmers obtained more than twice the average unimproved yield from their reduced acreage under maize.

72. Neither the Eastern Province Scheme nor the Namwala Scheme were operative this year, but detailed plans were under discussion.

Peasant Farming Schemes.

73. These schemes conform generally to one main pattern, namely the establishment of groups of planned African farms held on a form of leasehold tenancy from the Native Authority. The farmers receive material assistance by way of loans for implements, cattle, etc., from the Development Authority through the Commissioner for Native Development: supervision and technical assistance are provided by the Agricultural Department and, where necessary, marketing is arranged through Co-operatives. The first of these schemes was started in 1948, at Kawaza in the Eastern Province, under the supervision of the Provincial Administration and it has been most successful.

EASTERN PROVINCE.

74. This year the ten farmers at Kawaza in their third season produced 265 bags of maize from sixty acres, 235 bags of groundnuts from 120 acres, of which they sold 132 bags and 216 bags respectively, plus small quantities of rice, simsim and green gram. Yields were on the low side but nevertheless the average income was £75 per farm as compared with £47 10*s*. 0*d*. in the previous year. All the farmers made substantial repayments on their loans for livestock, implements and clearing. The average loan was £113 and of this £40 has been repaid.

75. Other groups in the Eastern Province include the Walubwe block of six farms which were started in 1949. This year the six farmers grew only enough maize for their own requirements and sold eighty-four bags of groundnuts out of ninety-three bags produced from thirty-six acres, plus twenty-eight bags of rice and some green gram. The average income of this group was £45 and the average repayment was £13 on their loans, which in this case was only £71 on the average. A third block at Sinda was started in 1950 and was not in full production. The eight farmers here produced 114 bags of maize and seventy-nine bags of groundnuts of which they sold forty-five and sixty-one bags respectively. The average income was £24. No repayments were due this year. The average loan indebtedness at Sinda was £107 which will be increased by a further £25 for clearing still to be done. Two new blocks have been marked out at Kanyanga and Chakompwa respectively. This brought the total number of farms marked out to fifty, of which thirty-four were occupied, the others were still being opened up ready for occupation.

76. The scheme in the Eastern Province was administered by the Area Development Team at Katete. Land clearing was a big job which was well organised by the District Officer in charge of rural development: costs have worked out at approximately £3 per acre. All farms were contoured and divided into plots for crop rotation: cattle were used for draught purposes and kraal manure was used on the fields. The size of the farms varies from eighteen to thirty acres of which nine to eighteen acres respectively, at a time, were under the plough. Experience seems to indicate that the capacity of the average peasant lies somewhere between nine and eighteen acres of crops. It was observed that of the 447 bags of groundnuts marketed at Katete this year, 361 bags were the produce of twenty-four peasant farms.

CENTRAL PROVINCE.

77. At Serenje, in the Central Province, there were five groups in full production, plus two new groups being developed. The position may be summarised as follows:

Name of group	*No. of farmers*	*Average acres cleared per farmer*
Lumpampa	11	20
Bulila	10	10
Mulembo	9	10
Sasa	10	10
Musolo	10	10
Mulembo No. 2	8	10 in preparation
Mulembo No. 3	—	10 demarcated

While there are local variations between the groups, on the whole soil conditions at Serenje may be described as poor plateau types with little or no inherent fertility. Moreover, the people in the district normally practise a "Chitemene," i.e., burnt garden system of subsistence culture. This experiment in peasant farming is therefore being conducted under the most adverse circumstances as compared with the Eastern Province. The main cash crop was kaffir corn (sorghum).

78. The production and income of the groups may be summarised as follows:

Number of farmers: 50.

Total food produced by all farmers: 592 bags.

Total food sold by all farmers: 440 bags.

Total gross income for all farmers: £708 18*s.* 7*d.*

Average income per farmer: £14 15*s.* 5*d.*

In the previous year the average income was £11 17*s.* 2*d.* This was a very difficult season from the point of view of the weather and farming generally. This was brought out very forcibly by the fact that the Marketing Union succeeded in buying only 210 bags of food throughout the district as a whole, over and above the 440 bags bought from the peasant farms. Indeed, it was observed that the Peasant Farming Scheme, although technically still very much in an experimental stage, fully justified its existence to the extent that it undoubtedly alleviated a food situation that might have been critical.

79. A criticism of the scheme was that the communal ownership of implements retarded the work. As a result, farmers requested to be allowed to purchase their own implements. This was arranged. Some farmers bought their implements immediately after harvest for cash; others required credit. The position was summarised thus:

Implement	*Value* £ *s.* *d.*	*No. paid for in cash*	*No. on credit*	*Total*
Ploughs (small)	4 5 0	17	19	36
,, (large)	7 10 0	5	15	20
Harrows	10 10 0	—	4	4
Ridging Ploughs ...	5 5 0	—	1	1
Planters	12 0 0	—	2	2
Grinding Mills	6 15 0	—	1	1
TOTALS ...	£45 15 0	22	42	64

In addition, each of the established groups has bought, on credit, a scale costing £6 for communal use.

80. The livestock position at Serenje was not altogether satisfactory. Each of the five groups was loaned sixty head of admittedly rather poor quality cattle, but disease has been particularly bad at Bulila. The state of affairs after two to three years was as follows:

Group	*Cows*	*Oxen*	*Calves*	*Young Bulls*	*Total*
Lumpampa ...	12	20	37	—	69
Mulembo ...	53	51	22	3	129
Bulila	—	23	—	—	23
Sasa	36	19	22	—	77
Musolo	33	18	16	—	67

81. Taking the scheme as a whole, progress was slow, but on balance it was satisfactory in the circumstances. As already indicated the Native Authority has agreed to two new blocks being opened at Mulembo and a third new block was under consideration at Lumpampa.

82. In the Mumbwa district the possibility of opening a group of twenty peasant farms was under investigation.

Western Province.

83. A start was made with peasant farming schemes in the Fort Rosebery district where two groups of ten farms each were demarcated near the Ndoba road. By the end of the year seven farms were sufficiently developed and were occupied by seven volunteers.

Northern Province.

84. There were three groups of peasant farms. The Mukosa group of five farmers, who are really typical peasant farmers, had a satisfactory year. One man produced more than half a ton of wheat for sale and the others one ton between them. All the holdings are irrigated. The Ngalula group of ten farms was demarcated only last year and development has been slow. Five farms were taken up and one was used as a demonstration holding. At the Mwambala group, in the Abercorn district, the number of farmers was increased from thirteen to twenty-two this year. The majority of the farmers have twelve acres and more developed for crop production, and one farmer has twenty-four acres. This group made satisfactory progress and its future holds great interest since there is scope for expansion up to 200 farms or more.

85. Summing up the year's work with the Peasant Farming Schemes, the number of peasant farmers actually in occupation of their holdings was nearly doubled, from sixty-seven to 123. It was a difficult year for farmers everywhere and these peasant farming schemes can be said to have stood up to a severe test very well indeed.

Oil Palms.

86. Funds are provided in a Colonial Development and Welfare Scheme—Extension Services: Field Operations, for an investigation into the possibility of developing the cultivation of oil palms in the Luapula–Lake Mweru area of the Western Province. In order that our approach to the problem should be on the soundest lines, the Agricultural Officer concerned, Mr. A. T. Wilson, was sent on a three-weeks tour of the oil palm research stations in Nigeria, through the good offices of D. L. Martin, Esq., of Messrs. Unilever, and the Director of Agriculture, Nigeria. Mr. Wilson wrote an extremely good report on all that he saw that might have a bearing on our problem. On this basis he was able

to get out a " blue print " of exactly how our investigation should be put in hand and he indicated the milestones in a journey that is estimated to take approximately twelve years.

87. In accordance with the programme of work, " bunch analysis " was started on oil palms in the valley to assess the suitability of local fruit for hand pressing. Preliminary results were favourable and the work will be continued. The Agricultural Officer visited Kilwa Island in Lake Mweru to make preparations for selection work on some 2,000 to 3,000 trees. The three four-acre nursery plantations which were cleared in 1950 were planted with simsim and sunnhemp as a preparation for seedlings that were not yet big enough to transplant from the nursery.

Rice.

88. Under the above-mentioned Colonial Development and Welfare Scheme there is provision for stimulating the cultivation of rice. A large number of small pilot schemes, at village level, were carried out throughout the Territory wherever conditions were suitable. Some schemes, e.g., at Chadiza in the Eastern Province, were irrigated from horse-shoe dams specially constructed for the purpose. Others, e.g., at Kawambwa, were simply controlled cultivation on the fringes of dambos. In Barotseland, there were experimental padis with controlled irrigation by canals. Despite a very difficult season due to drought, progress was generally satisfactory especially in the Bangweulu–Luapula area and in Barotseland. The following figures show something of the achievement in Barotseland. Figures prior to 1950 are largely guesswork but it seems clear that rice production has been trebled in the three seasons:

Area	*Estimated total production of Padi in bags of 160 lb.*				*No. of bags of Padi marketed in* 1951
	1948	1949	1950	1951	
Ndanda	—	—	280	370	330
Luandui (and Lui) ...	—	—	9	20	18
Mutondo (and Lui) ...	—	—	12	25	20
Namushakende & Kataba	—	—	20	40	9
Mongu and Mabumbu ...	—	—	50	150	120
Other areas	—	—	5	20	0
Total Mongu District ...	40	100	376	625	497
Kasabi	—	—	100	430	388
Luampa	—	—	10	172	160
Katunda	—	—	60	50	40
Total Mankoya District...	30	50	170	652	588
Total Senanga District ...	5	7	20	100	50
Total Sesheke District ...	No figures available			15	12
Total Kalabo District ...	Negilgible			15	8
Total for Barotseland ...	80	170	566	1,407	1,155

89. Reference has already been made in this report to the difficulties that were experienced in the Eastern and Western Provinces in particular in the disposal of the rice. The matter was taken up through the Director of Trade, Transport and Industry, while at the same time steps were taken to produce a better quality rice.

Agricultural Education.

90. The Territory's three African Agricultural Training Schools were built through funds provided under a Colonial Development and Welfare Scheme. With the exception of the installation of electric lighting plants that were delayed in transit, the Monze and Lunzuwa Schools were completed and in full working order. The Katete School, however, had several set-backs and the buildings were still not finished by the end of the year. Although the scheme actually finished this year the Secretary of State has agreed to the balance being available so that the Katete School may be completed according to plan.

91. Despite the building problem at Katete the first trainees completed an eighteen-month course in July, plus varying periods of practical work. Eleven trainees took the final examination, eight passed and were absorbed into the service, two failed and one was judged to need further practical training. The annual rate of entry to the Katete school has been far below the capacity of the school and the needs of the Department. Only five trainees are in the course which is due to end in 1952 and only seven (two of them already members of the staff of the Department) entered the course which will end in 1953. This important matter has been taken up with the Director of African Education and the Establishment Division and it is to be hoped that some solution will be forthcoming.

92. At the Lunzuwa School the twenty trainees who started in 1950 all passed the first-year examination. Twenty-five trainees started on the practical introductory work this year, but of these one died, two left voluntarily, two were found not to have the Standard VI qualifications and four were found unsuitable and returned to their homes. The Governor, Sir Gilbert Rennie, paid a short visit to the school in August and gave a talk to the trainees.

93. The Monze School was filled almost to capacity. Students in training in both courses were fifty in all, drawn from all provinces. Eighteen were successful of the nineteen trainees who finished the second eighteen-month course this year. The total wastage since the start of this second course

amounted to fifty-seven per cent. Only twenty-two of the thirty-one trainees in the third course completed the first stage. The fourth course started on 1st November, with thirty-six trainees.

94. At Mapangazia in the Southern Province, a tractor-driver training school was tried experimentally on a small scale. Sixteen pupils with at least Standard IV education were given a course of lectures and practical work extending over a period of five months. Seven Ferguson tractors were used with a complete range of equipment including ploughs, subsoilers, damscoops, graders, trailers and disc terracers. Nine out of the sixteen trainees finished the course satisfactorily, of whom one was considered first class.

95. In regard to European agricultural education the first two-year diploma course at the Gwebi Agricultural College in Southern Rhodesia was completed at the end of the year. Two of the three Northern Rhodesian students passed successfully, of whom one returned to assist his father on a farm at Chisamba, while the other has embarked on further practical training in Southern Rhodesia. One student failed. In the second course, the story of the Northern Rhodesian students was not so good: one was a medallist and quite outstanding, one left the course and one was asked to leave at the end of the first year for not being up to standard. In selecting the applicants for the third course, every endeavour was made to select lads who are likely to make the grade.

School Gardens.

96. School gardens were inspected and all possible assistance was given by Provincial and local Agricultural Officers whilst on tour. Relations were particularly fruitful in the Northern and Western Provinces. Demonstration six-course rotations were laid out for a number of schools. In the Southern Province several schools were "improved farmers." The Provincial Agricultural Officer, Central Province, wrote a guide on vegetable growing with particular reference to school gardens; it was published as Bulletin No. 2 of 1951, and was accepted as a standard book by the Director of African Education. In Barotseland, special agricultural courses were arranged for Agricultural Indunas, Jeanes School Supervisors and teachers.

Research Services.

97. The establishment of a Central Agricultural Research Station and three subsidiary stations was accepted by the Secretary of State as a 100 per cent. charge against Colonial Development and Welfare funds. The Northern Rhodesia Government purchased a site at Mt. Makulu, near Lusaka, for the central station in December, 1950, and work was started there on 1st January, 1951. An Agricultural Supervisor was put in charge of the place from the start and a building foreman was appointed on 1st April, 1951. Since then the following buildings have been put up: a small house now occupied by the building foreman, a two-roomed servants' quarter for the homestead, a substantial store near the homestead, the foundations of a permanent African compound, consisting of eleven two-roomed and five double two-roomed P.W.D. standard houses, of which six African houses were completed, an implement shed comprising four bays, each fourteen feet by thirty-six feet, and two workshops, each twelve feet by thirty-six feet, and a European officer's house of the A.K.3 type up to roof level. The Department of Water Development found and tested a successful borehole. A contour plan of the station was made and essential earthworks were completed by the Conservation Mechanical Units. Seventy acres of sunnhemp for ploughing in, forty acres of maize and several maize experiments were planted. A comprehensive development plan was made which is being carried out as expeditiously as possible.

98. After considerable investigation, a decision was made to locate the Bangweulu–Luapula Agricultural Research Sub-station at Samfya, where it will be constructed as part of the inter-departmental research set-up, including fisheries, forestry and agriculture.

Research and Experimental Work.

99. The Soil Chemist moved his headquarters on 1st May, from Ndola to Lusaka, so as to put in hand a comprehensive programme of carefully planned fertilizer trials on maize, tobacco and groundnuts for the 1951-52 season. Nine weeks were spent in the laboratories of the Southern Rhodesia Department of Agriculture, analysing sixty-five soil samples for the East African Railway Link survey party and in connection with the proposed irrigated sugar cane pilot scheme in the Gwembe Valley on the Zambezi.

100. The main results of a wide range of trials and experiments were as follows:

Eastern Province.

A fertilizer trial on flue-cured Virginia tobacco on relatively heavy soil at Msekera gave indications that a significant increase in yield was obtained from applications of 200, 400 and 600 lb. per acre of standard tobacco B mixture; there was no significant advantage in using more than 200 lb. per acre. Nitrogen appeared to be the main fertilizer constituent affecting yield but there was no conclusive evidence on the effect of fertilizers on quality. A spacing experiment showed no significant difference in yield between spacings of three feet by three feet, four feet by two feet, three and a half feet by two feet, and three feet by two feet. A variety trial was seriously affected by drought and more than fifty per cent. of the leaf was discarded as scrap. The broad-based American varieties gave the highest yields followed by Trelawney Hybrid C7, and Bonanza. C7 gave the highest proportion of bright leaf and with Bonanza the lowest proportion of scrap.

101. Experiments with Burley tobacco at Petauke were seriously affected by drought. The only clear indication was that White Burley was the best variety for these conditions.

102. A variety trial with groundnuts at Petauke indicated that Virginia Bunch gave a higher yield than the local variety, with Natal Common between the two. This result was in line with a similar experiment at Msekera. An experiment which has been in progress for six years at Petauke

seemed to prove conclusively that rotational cropping of maize and groundnuts paid better than mixed cropping. In fertilizer trials at Katete and Petauke, phosphate gave no response, while kraal manure and nitrate of soda appeared to have some beneficial effect on maize. Faya rice gave the highest yield both in the valley at Lundazi and on the plateau at Chadiza, as compared with other imported and local varieties. A number of dwarf sorghum varieties introduced from the United States and grown in small plots at Petauke gave yields in some cases at the rate of from 1,200 to 2,700 lb. per acre. On sandy soil at Katete, the sorghum variety, " Radar," yielded at the rate of 1,200 lb. per acre.

Southern Province.

103. At the Mochipapa Tobacco Station most of the trials were of such a nature that results must be observed over a period of years before much attention could be paid to them: this applies particularly to rotations, fertilizer, and variety trials. In a seed bed trial, it was obvious that the rate of evaporation was higher under cheese cloth than under grass and in consequence an extra watering was required. Overhead irrigation of the particular type used proved unsatisfactory as the spray was too coarse tending to dislodge the seedlings and leaving the stands very patchy. A permanent type of seed bed in which the plants were watered by capillary action from a surrounding trough proved so satisfactory that three more of the same type have been constructed for next season. Trials of a proprietary soil fumigant on seed beds and on a field scale clearly showed the treatment more than paid its way. A fertilizer trial of the effect of 200, 400 and 600 lb. Rhodia A (6-12-8) tobacco mixture gave progressive increases in yield of leaf as follows:

Treatment	*Yield of leaf lb. per acre*
Nil...	276
200 lb. Rhodia A/acre	488
400 lb. ,, ,, ...	691
600 lb. ,, ,, ...	825

In this experiment all the plots were relatively free from leaf spot and there was no difference between the treatments in this respect. Under the heaviest treatment, individual plants tended to be coarse, but the leaf was not difficult to cure and it produced good quality bright leaf. In the variety trial with Turkish tobacco, " Monopoly " again proved the best. Five varieties of Samsoun tobacco were tried for the second year and indicated that there was little to choose between four of the varieties, namely, Maden, Dere, Djanik and Djanik Bald Jali, which gave an average yield of 462 lb. per acre and was sold at thirty-seven pence per lb. The fifth variety, TS5, produced a low yield of poor-quality leaf. Trials of various grass species as leys in tobacco rotations were continued. Rhodes Grass (*Chloris gayana*) and Milanje Grass (*Digitaria milanjensis*) appeared the most likely, but it remains to be seen what the effect of a three or four-year ley will be on the crumb structure and fertility of the soil.

104. At several centres in the Southern Province the Southern Rhodesia Double Hybrid Maize was compared with Hickory King, with the following results in favour of the Hybrid:

	Yield in bags per acre	
	Double Hybrid	*Hickory King*
Magoye	9.2	8.8
Monze	9.6	8.5
Choma	14.2	8.8

Central Province.

105. At the Chalimbana Agricultural Station, 175 acres of maize yielded at the rate of seven bags per acre. Lampton oats yielded nine bags per acre. Ten acres of irrigated wheat varieties gave yields ranging from one and a half bags per acre from 46–W71 to six and a half bags from 46–W30. The variety 46–W59 yielded four and a quarter bags, while 117A and Bearded Kruger gave three and two and a half bags per acre respectively. In trial paddocks of different grass species *Panicum makarikariensis* was the most successful.

106. At Mukalaikwá, in a phosphatic fertilizer trial on groundnuts, powdered superphosphate broadcast was tested against tablets of superphosphate placed near the seed. A consistent response to superphosphate was found, but only amounting to an increase of twelve per cent. in yield above the control " Nil " treatment. Moreover, an application of 90 lb. superphosphate per acre gave as big a response as 250 to 300 lb. per acre. There was no advantage in using the fertilizer in tablets.

107. In a co-operative experiment on the farm of Messrs. McArthur and Uys, at Broken Hill, observations were continued on the tobacco rotations. Rhodes Grass appeared to be the most promising ley species; *Panicum makarikariensis* had been rather heavily grazed and showed signs of being seriously invaded by indigenous species.

108. At Chililabombwe Agricultural Station (Serenje), trials of various crops under different treatments provided useful basic data on the potentialities of the typical plateau soils of the district. Yields of kaffir corn (sorghum) ranged from two bags to five bags per acre: the dwarf variety, " Radar," gave two and a half bags. Maize yielded eight and a half bags per acre after a previous crop of sunn-hemp. Finger millet yields ranged from two and a half to six and a half bags per acre. Groundnuts yielded between 150 to 400 lb. kernels per acre. In a comparison of various pulses, upright cowpeas gave a yield of 411 lb. per acre, sunnhemp, 450 lb., cowpeas, 398 lb., velvet beans, 771 lb., and Red Canadian Wonder beans, 261 lb. per acre. An investigation into the yield of food crops from large as compared with small " circles " on the chitemene system was inconclusive.

Western Province.

109. At Kambowa Agricultural Station, several experiments on maize have shown that the outstanding feature was a consistent and very large response to nitrogen as sulphate of ammonia. On medium soil an application of 240 lb. sulphate of ammonia gave an increase of 1,000 lb. maize per acre. The application of a second 240 lb. sulphate of ammonia gave only a further 500 lb. increase in yield. It was also demonstrated, however, that time of application was of great importance: top-dressing with sulphate of ammonia at six weeks after planting gave best results. The position regarding the efficacy of phosphate fertilizer under these conditions was still in doubt: the indications were that phosphate was less important for maize than had been generally assumed, but further investigation is required. At Fort Rosebery, trials of cassava indicated that from 3,240 lb. to 3,896 lb. cassava flour was obtained from three- to four-year-old cassava on lake basin soils. Two-year-old cassava yielded 704 lb. to 1,568 lb. flour per acre. At Nsakaluba (Kawambwa district), trials of various ways of handling and packing bananas for the Copperbelt market indicated that fruit picked to ripen in five to six days and packed in baskets containing an average of fifteen hands was best and most economical. The market possibilities were estimated to be five tons of bananas per week.

Northern Province.

110. At Lunzuwa and several ancillary seed farms, selection work on food crops was continued. Eight varieties of kaffir corn (sorghum) yielded over eight bags per acre. The early and late burning demonstration that has been maintained over a period of years has shown conclusively that late burning prevents the re-growth of tree vegetation and encourages grass, whereas under a system of early burning trees and bush cover are maintained.

Barotseland.

111. At Namushakende, twenty-six acres of the agricultural station were devoted to yield and crop trials comprising rice, wheat, maize, sorghum, cotton, field peas, buckwheat, cassava, potatoes, sunnhemp, fodder crops, sugar cane, groundnuts, pigeon peas, fruit trees, vegetables and spices. Local selections of Angola Crystal rice gave yields of up to 4,311 lb. paddy per acre, while Tanganyika Faya gave 4,675 lb. paddy per acre. Increases in yields of maize of the order of 500 per cent. were obtained following the practice of green manuring on poverty-stricken land.

Surveys and Special Services.

112. (i) A combined survey with the Forestry Department and the Provincial Administration was completed of an important section of the lake basin area south-west of Lake Bangweulu. A comprehensive report was compiled which was useful in fixing the limits of the Forestry Department's proposed tree plantations. The Agricultural Officer extended the survey northwards so as to complete the picture. The area has agricultural possibilities.

(ii) In the Northern and Western Provinces an exhaustive search was made by the senior officers concerned to locate a suitable site for a rice research station to serve the Bangweulu–Luapula intensive development area. It has been decided to build a main research station at Samfya in association with the Game and Tsetse and Forestry Departments, with a sub-station at Mubende in the Luapula valley.

(iii) Several of the senior officers were associated with the E.C.A. Railway survey party to investigate the agricultural potentialities of the route through the Central and Northern Provinces. The Soil Chemist spent six weeks in the laboratories of the Department of Agriculture, Southern Rhodesia, in Salisbury, analysing soil samples on behalf of the E.C.A. party.

(iv) An ecological survey of a possible resettlement area near Namwala was completed: this fills in another gap in the ecological map, although it did not provide a resettlement area on account of the presence of tsetse fly and lack of water at present.

(v) A ground survey of five possible areas for European farming on the Copperbelt was completed and mapped from aerial photographs. The results were disappointing.

(vi) A watershed conservation problem has been investigated in the Upper Kaleya and a preliminary report has been submitted to the Provincial Commissioner, Southern Province. It is expected that a pilot scheme will be started early in 1952.

(vii) In connection with the development of oil palms in the Luapula–Lake Mweru area, the Agricultural Officer concerned visited Nigeria and submitted an excellent report, including a programme of work for the next two years.

Legislation.

113. No new legislation was passed during the year. The following General Notices affecting the Department were, however, gazetted:

General Notice—	414	Membership of Board of African Agriculture.
	1,349	Membership of Committee to administer African Farming Improvement Fund.
	1,000 and 1,023 ...	Drought Loans.
	72 and 521 ...	Membership of Board of European Agriculture.
	1,081 and 1,306 ...	Subsidization of Fertilizers.

General Notice—	454	Abolition of Maize Levy and increase in selling price of maize.
	285	African Grown Maize: Good Farming Bonus, 1951.
	142 and 721 ...	Price for African Grown Maize.
	143 and 721 ...	Price for European Grown Maize.
	1,343	Increase in selling price of maize and maize meal.
	1,022	Maize Price for 1952-53 Pool Year.
	869	Maize Control Board appointments.
	459	Purchase of subsidized maize meal by farmers.
	773	Definition of "New Settler."
	437	Tobacco Marketing and Levy Ordinance. Membership of Eastern Tobacco Board.

Publicity and Publications.

114. Officers of the Department and members of the African staff contributed a great deal of material to the Information Department for publication and broadcasting.

No. of broadcast talks	49
No. of articles for *Mutende*	14
No. of miscellaneous articles	1
TOTAL ...	64

115. The Department put on a comprehensive exhibit that attracted favourable comment at the Agricultural Show on the new showground in Lusaka. The Department also assisted in other shows during the year, notably at Katete in the Eastern Province and at Fort Rosebery.

116. The Bulletins of the Department were in demand. Three new bulletins were issued this year:

No. 1 of 1951. Harvesting, Curing, Grading and Baling Flue-cured Virginia Tobacco. By J. C. Collins, B.SC. (EDIN.), Tobacco Adviser.

No. 2 of 1951. Intensive Vegetable Growing for Africans. By B. C. Wills, B.SC., DIP. AGRIC., A.I.C.T.A., Agricultural Officer.

No. 3 of 1951. The Line Level and its use in Soil Conservation. By M. Halcrow, O.B.E., B.SC. AGRIC. (HONS.), DIP. AGRIC. (CANTAB.), A.I.C.T.A.

Visitors.

117. Dr. W. H. Dodge, Senior Botanist, Division of Plant Exploration and Introduction, U.S.A.

The Paramount Chief of Barotseland.

Dr. F. J. Harlow, Assistant Adviser on Technical Education to the Secretary of State.

Mr. D. L. Martin, of Unilever Ltd., London.

Mr. N. H. Hughes, Manager, Lever Bros. (Rhodesia) Ltd., Salisbury, Southern Rhodesia.

Professor C. Y. Shephard, C.B.E., Imperial College of Tropical Agriculture, Trinidad.

Mr. McDermott, High Commissioner for Canada in the Union of South Africa.

Sir William Gavin, C.B.E., Dr. Russell T. Odell, Dr. R. L. Matlock, together with C. C. Marshall, Esq., J. P. McDonagh, Esq., J. C. Dickie, Esq. (Sir Alexander Gibb and Partners), East African Railway Link.

MAGNUS HALCROW,
for Director of Agriculture.

18th April, 1952.

APPENDIX

CONSERVATION SERVICES.

ANNUAL REPORT, 1951.

Late in 1950 the Chief Conservation Officer was relieved from the cares of the Groundnut Scheme, and in April of 1951 the administration of the Broken Hill experimental work and of the Lusaka Government Farm was handed to the Provincial Agricultural Officer.

Workshop Centre—Conservation Services.

2. Much delay has still been experienced in the completion of buildings at the new Workshop Centre. Temporary rooms were erected, and two houses completed during the course of the year, and it is hoped that further workshop buildings and six houses will be completed during 1952.

3. The establishment of a European fitter and turner, welder and blacksmith, and mechanic to assist the Conservation Superintendent has further ensured the efficient working of the Conservation Units. All repairs and servicing of units have been carried out by this vital centre. Undue delays, on account of the difficulty of obtaining spare parts, have been overcome to a certain extent by manufacturing on the spot. The spare parts position, however, continues to be extremely embarrassing.

Field Operations.

4. The European Farming Area has continued to be run under the following five groups:

1. Lusaka—Kafue Group Area.
2. Mazabuka—Monze Group Area.
3. Chisamba—Broken Hill Group Area.
4. Choma—Kalomo—Livingstone Group Area.
5. Fort Jameson Group Area.

5. The movement of machinery and staff has been directly organised by the Chief Conservation Officer, but with the realisation of the necessity of the farmers taking more responsibility and with the rapid formation of intensive conservation areas and committees, the responsibility of the organisation of future works has been handed to the committees, advised by the Conservation Services.

6. To date, with only three Conservation Officers available, work has been mainly confined to the first three areas. The Chief Conservation Officer has, however, paved the way for early development in Area Four during 1952. Area Five will have the preliminary attention of a conservation officer in 1952. He will prepare for a more intensive approach, supported by a mechanical unit, in 1953.

Intensive Conservation Areas.

7. Officers have continued to maintain a constant and close contact with the farmers in assisting the formation and development of the intensive conservation areas and in carrying out general advisory works. The main attention has been devoted to farm planning and to the construction and design of soil and water conservation works. Areas are, however, far too large for officers to do more than touch the fringes of essential individual works.

Planning and Mapping.

8. It is to be hoped that a planning and mapping staff will be organised in 1952, and that conservation development approach in European areas, over the next few years, will develop into a more organised planned scheme to replace the individual isolated works of the present and past.

Lusaka—Kafue Group Area.

9. *Mechanical Unit.* One D8, two D6's and equipment. One D8 was available as from April, 1951, but broke down, due to clutch trouble, in October. This machine stood for the rest of the year since spare parts were unobtainable. The two D6's have been working erratically during the course of the year. These were the original two tractors and are overdue for their first overhaul. Spares, however, were unobtainable.

10. A mechanical supervisor was only available for this unit during the last third of the year; the machines were only worked on special jobs to assist individual farmers.

11. As a result of the above factors, returns were far from satisfactory. NOTE.—*Lusaka—Kafue Group Area* on the accompanying sheet of analysis of works done.

Analysis of Works Done.

12. *Dams.* Four small dams totalling 17,994 cubic yards of earth fill and holding 12,145,000 gallons of water.

13. *Conservation Layouts.* A total of 1,450 acres of land have been completely protected with 19,185 yards of storm drains and 39,600 yards of contour ridging. 1,230 acres of this were constructed by the conservation units.

14. *Storm Drains.* Averaging about three feet six inches in height and twelve feet base were constructed at an average cost of £3 1*s*. 0*d*. per 100 yards. A maximum cost of £4 1*s*. 0*d*., minimum of £2 5*s*. 0*d*.

15. *Contour Ridges.* Averaging about sixteen inches in height and eleven feet base were constructed at an average price of £1 18*s.* 7*d.* per 100 yards. A maximum cost of £3 2*s.* 6*d.* was registered for large broad-based terraces. A minimum figure of 18*s.* 6*d.* per 100 yards referred to ridge cores of eight feet base and fourteen inch height.

16. *Intensive Irrigation Layouts.* Sixty-five acres of land levelling and irrigation layouts were constructed by this unit.

17. *Bush Clearing.* 720 acres of land, mainly on tobacco farms, have been cleared and planned. The average cost per acre, windrowing, was £1 15*s.* 9*d.* and, bush clearing, £2 12*s.* 9*d.*

18. *Roads, Traces and Fireguards.* The unit has constructed seven miles of roads and fire guards in general farm planning.

19. In view of the lack of a Mechanical Supervisor, the Conservation Officer was compelled to spend much of his time organising the running of the units. He made 325 visits on forty-nine different farms, and advised with regard to possible dam sites, conservation layouts, irrigation and orchard projects, in addition to the actual works accomplished.

Chisamba—Broken Hill Group Area.

20. *Mechanical Unit.* One D8, two D7's and their equipment. One D8 was available to this unit throughout the year. As it was supplied without a radiator guard, which despite every effort is not yet to hand, the work it could accomplish was limited and hours were lost in consequence. The two D7's have done remarkably well, but have caused considerable trouble, as they are well past their overhaul date. Their overhaul has been delayed by lack of spares.

21. Giving full consideration to the above and the early heavy rains in the Broken Hill district, the hours returned by this unit are fair. The loss due to contract work at 1*s.* 5*d.* a cubic yard on dams amounts to £2,620 0*s.* 0*d.* This loss was due to the long distances travelled to collect anthills for mixing with the sand fill, and to inexperienced staff which took some time in learning the most efficient and economic methods of dam construction.

22. A further £1,060 18*s.* 4*d.* was lost, due to the cancellation of chargeable hours by the Chief Conservation Officer on account of inefficiently constructed works or experimental works, all of which are a fair charge against such a young organisation. NOTE.—*Chisamba—Broken Hill Group Area* on the accompanying sheet of analysis of works done.

Analysis of Works Done.

23. *Conservation Layouts.* No definite layouts have been constructed in this area in 1951, but all bush clearing has been planned with a view to general conservation principles.

24. *Bush Clearing.* 624 acres of land were cleared and planned. Time taken was an average of ·9 hours per acre at a cost of £3 3*s.* 0*d.* Costs varied from £4 9*s.* 6*d.* to £2 6*s.* 10*d.* per acre.

25. *Windrowing.* 222 acres of land were windrowed at an average of ·94 hours per acre, and costing £3 5*s.* 9*d.* per acre. Costs varied from £2 0*s.* 0*d.* to £4 9*s.* 7*d.*

26. *Roads, Traces and Fireguards.* Sixteen miles were cleared and levelled as part of the general planned developments. The average width was forty feet and cost £28 0*s.* 0*d.* per mile. Roughly one mile took eight hours to make.

27. *Ripping and Sub-soiling.* Many hours were lost in attempting to do dry season sub-soiling. This operation has proved uneconomical with machinery available. Success was attained, however, when ripping under semi-dry conditions. 420 acres were ripped at ·6 hours to the acre and at an average cost of £2 2*s.* 0*d.* per acre.

28. Extensive touring was done by the conservation officer over an extremely large district. Chisamba and Broken Hill had most attention but a limited number of visits were made to the copper mines and the Mkushi block. A total of seventy-three farmers were visited and some 320 visits were made. Close contact was maintained in the formation of the new intensive conservation area committees.

Mazabuka—Monze Group Area.

29. *Mechanical Unit.* Two D7 tractors and equipment. This unit has shown a fairly satisfactory return, considering that one tractor was without a dozer and the unit had many long moves. In addition, many hours were lost at the end of the year as a result of trying to finish dam programmes in the face of early, constant and heavy rains.

Analysis of Works Done.

30. *Dams.* NOTE.—*Mazabuka—Monze Group Area Dams* on accompanying sheet.

31. *Conservation Layouts.* Complete conservation protection was built by the units over 970 acres. A total length of 26,000 yards of ridges of some sixteen inches high and twelve feet base width were constructed. They cost from £1 13*s.* 9*d.* to £2 12*s.* 8*d.* per 100 yards of ridge.

32. *Storm Drains.* Over the same area 5,500 yards of storm drains, of an average height of four feet six inches and base width of twelve feet, were built at a cost of £6 5*s.* 0*d.* per 100 yards.

33. *Skeleton Protection Layouts.* This term refers to heavy storm drains, guide banks and buffer or reduction dams being constructed, covering large units of land. The farmer constructs the lighter works in between. 5,800 yards of these drains of some four feet to five feet in height and fourteen feet base width were constructed to protect 450 acres.

34. *Watershed Protection Works.* This is another system of protection work, designed to discourage the rapid storm water flood movement of water; two schemes were built, including five dams, covering some 350 acres of country.

35. The Conservation Officer paid 193 visits to fifty-three different farms. In addition, close contact was maintained with all intensive conservation area committees. 2,781 acres of arable land were protected with 95,790 yards of ridges laid out by the conservation officer and constructed by the farmer. These were in addition to those constructed by the units.

General.

36. Although there is room for much improvement, considerable groundwork has been carried out and contact made by the individual officers with the farming community. It is essential in these works to maintain and develop the sense of communal responsibility amongst the farmers, rather than to rely on the haphazard scattered individual approach that has been necessary to date, and at the earliest possible opportunity to consolidate works under intensive area planned schemes.

37. When these two factors can be developed, work will be much more efficiently accomplished both by officers and machinery.

38. Considerable unlisted visits have been made and attention has continued to be given direct to farmers by the Chief Conservation Officer, and the usual cordial association has been maintained and greatly appreciated by the Chief Conservation Officer and his staff.

J. NEIL CLOTHIER,
Chief Conservation Officer.

ANALYSIS OF WORKS DONE, 1951.

Tractor	*Number*	*Actual hours worked*	*At £2 15s. for D6 At £4 5s. for D8*	*Actual revenue*	*Expected hours*	*Expected revenue*
Lusaka—Kafue Group Area.			£ s. d.			£
D6 1	5,052	395	1,086 5 0	—	1,400	3,850
D6 2	—	856	2,354 0 0	—	1,400	3,850
D8	7,006	704	2,992 0 0	—	1,400	5,950
TOTALS	—	1,995	£6,432 5 0	£6,215 4 6	4,200	£13,650
Chisamba—Broken Hill Group Area.			*At £4 5 0 for D8 At £3 10 0 for D7*			
D7	5,085	1,149	4,021 10 0	—	1,400	4,900
D7	5,089	1,534	5,369 0 0	—	1,400	4,900
D8	5,086	1,192	5,066 0 0	—	1,400	5,950
TOTALS	—	3,875	£14,456 10 0	£10,775 11 8	4,200	£15,750
Mazabuka—Monze Group Area.			*At £3 10 0 for D7*			
D7	5,072	1,377	4,819 10 0	—	1,400	4,900
D7	5,073	1,431	5,008 10 0	—	1,400	4,900
TOTALS	...	2,808	£9,828 0 0	£9,646 0 9	2,800	£9,800

DAMS.

Chisamba—Broken Hill Group Area. *Spillway costs* £ s. d.	*Gallons water*	*Volume wall cu. yds.*	*Tractor hours*	*Cubic yards per hour*	*Actual cost per cu. yd.* s. d.
216 10 0	29,000,000	8,500	380	22.4	3 4
63 0 0	9,000,000	3,555	150	23.7	3 3
115 10 0	3,000,000	2,800	—	—	—
64 10 0	17,000,000	5,300	119	44.5	1 9
80 10 0	23,000,000	6,500	310	21.0	3 8
	48,000,000	12,000	218	55.0	1 5
123 0 0	20,000,000	4,615	197	23.4	3 3
	5,500,000	3,760	121	31.0	2 6
TOTALS ...	154,500,000	47,030	1,495	29.6	2 6
Mazabuka—Monze Group Area.					
	31,000,000	13,650	340	45.5	1 9
	5,400,000	2,000	35	57.0	1 3
	1,000,000	3,200	60	55.0	1 3
	1,200,000	2,550	43	59.0	1 2
	800,000	1,350	39.0	25.0	2 1
	19,000,000	23,400	541	43.0	1 7
	6,000,000	2,860	81	40.3	1 8
	6,500,000	5,460	129	48.0	1 5
	2,000,000	3,820	93	33.8	1 8
	16,200,000	2,760	54	51.0	1 4
TOTALS ...	89,100,000	61,050	1,415	43.1	1 7½

Revenue shown above totals £26,600.

The total expenditure on running the conservation mechanical units, i.e., under head 42-45—Conservation—Mechanical Units, amounted to approximately £34,000 at 31st December, 1951. This figure included the purchase of spares, fuel and stores amounting to £7,700 on hand at the end of the year. Depreciation of approximately £13,500 has to be provided.

The resulting loss is almost entirely due to machines standing for lack of spare parts. In addition, there has been a certain amount of experimental construction for which a reduction of charges had to be made. It is clear, however, that the hourly rates for machines will have to be increased and farmers have been warned that after 1st April, 1952, higher rates may have to be charged.